

antigen that is utilized and the amount that is superfluous, and therefore wasted in any given dose of vaccine. Even the small doses I have advocated are ample to provoke a very smart local and constitutional reaction in weakly, though otherwise normal, individuals such as myself.

Major A. ABRAHAMS, R.A.M.C.

My remarks relate to some clinical features of the cases which we have been able to study in the Aldershot Command.<sup>1</sup> The Connaught Hospital, Aldershot, is devoted to the treatment of medical cases supplied by a very large number of troops in a highly concentrated area, and with a normal complement of 500 beds. We extended these to 850 to accommodate the large number of admissions during the recent epidemic.

I wish first to refer briefly to the condition known as "purulent bronchitis" in the light of the disease now under consideration: those of us who worked in Aldershot during the winters of 1915 and 1916 were struck by the existence of a peculiar type of lung affection with which we were hitherto unfamiliar. The patients manifested the signs more or less of bronchitis, broncho-pneumonia or lobar pneumonia; but the very special features were the expectoration of enormous quantities of purulent sputum, a most characteristic heliotrope-coloured cyanosis, and a very dreadful mortality.

It was not until Lieutenant-Colonel French was appointed consulting physician to the Aldershot Command that we began to see the proper significance of these cases. Hitherto I had been disposed to regard them as occurring for the most part in young men of feeble physique and of short service who were unable to endure the exposure entailed by ordinary military service; and the circumstance that the bulk of the cases occurred in one unit was speciously explained by the fact that this particular unit was at that time being largely recruited from men of low grade. Colonel French, however, objected very properly that such cases were by no means restricted to the type which supplied the majority, and further, that older men with good histories and comparatively long service were occasionally affected, and post-mortem examination supplied the puzzling evidence that the lungs were relatively free from disease. His alternative suspicion of some infective factor satisfactorily explained

<sup>1</sup> My colleague, Captain Hallows (p. 41), has already dealt with pathological details.

the prevalence in one particular unit and his further investigations even narrowed the field down to a few special huts in one unit. It appeared indubitable therefore that we were dealing with a highly contagious disease and his communication to Sir Alfred Keogh led immediately to an investigation along these lines, in which we were assisted by Dr. John Eyre. In this way we quite unexpectedly made the discovery that the *Bacillus influenzae* was a factor in the condition, which appeared to be a primary infection by this organism that exalted the virulence of other organisms: the pneumococcus, *Streptococcus longus*, *Micrococcus catarrhalis*, and, rarely, other organisms constituting the secondary infection. We were then under the impression that our cases were endemic, more especially as we had learnt to recognize various peculiarities of respiratory disease for which this district is notorious; but just before we published our results, Hammond, Rolland, and Shore, who had been working in France, published an article<sup>1</sup> which clearly showed that they had encountered an exactly similar condition. Since then, various observers have published their experience of the condition in different parts of the country.

In our opinion these cases originally described by Hammond, Rolland, and Shore in France, and by Dr. John Eyre, Lieutenant-Colonel French, Captain Hallows, and myself<sup>2</sup> in Aldershot, were fundamentally the same condition as the "influenzal pneumonia" of the present pandemic. At the time when we were investigating "purulent bronchitis" there was no generalized epidemic to lead to the suspicion that it was of influenzal basis, and identification of Pfeiffer's bacillus was in this connexion of the nature of a discovery. But we are convinced that we are now witnessing the same disease upon a widely epidemic scale, notwithstanding an objection which may be advanced that one dominant peculiarity—the copious purulent expectoration—has been conspicuously absent in the recent cases. But this enables me to correct a mistake which we ourselves had perpetrated. We were disposed to regard the heliotrope cyanosis and the copious secretion of pus as interrelated, so that a mechanical explanation for the cyanosis was forthcoming. This we now see to have been wrong; the presence or absence of purulent expectoration is only an incident in the disease and not an invariable accompaniment. In really essential features—the heliotrope cyanosis and high mortality with variable lung condition—"purulent bronchitis" and "influenzal pneumonia" appear to us to

<sup>1</sup> *Lancet*, 1917, ii, p. 41.

<sup>2</sup> *Lancet*, 1917, ii, p. 377.

be one and the same thing—an influenzal pneumococcal or influenzal-streptococcal septicæmia.

In this Command the relatively trivial cases are treated at their own units and only the appearance of alarming symptoms or of pyrexia persisting over forty-eight hours sends them to hospital. The large majority of cases have of course been relatively trivial. Roughly speaking, of 1,000 cases, 800 perhaps have taken an ordinary simple uncomplicated course with fairly speedy recovery and without sequelæ. The remaining 200 have displayed pulmonary symptoms, of these perhaps eighty of moderate severity, and the remaining 120 have been desperately ill; and of this last category between sixty and eighty have died.

Of the symptoms encountered in this epidemic only a few stand out conspicuously to demand description. Signs in the chest have been remarkably variable, but even when what could be ordinarily accepted as unequivocal evidence that consolidation has been present the familiar features of lobar pneumonia with rusty sputum have been absent. The relative absence of expectoration has been a dominant and surprising feature of this epidemic. On the other hand, hæmoptysis has not been uncommon often when all alarming symptoms have disappeared and the case is convalescent. But hæmoptysis seems to be only an indication that the lungs have shared the general hæmorrhagic tendency in this disease, for epistaxis (in a very high percentage of cases) and hæmatemesis as well as hæmorrhages elsewhere have been noted. And a further indication of this tendency has been afforded by those cases which have developed a pleural effusion in which the fluid has been sterile and the preponderating cell the lymphocyte.

The colour of the patient is of particular interest in view of the baleful heliotrope element. In general one may say that once this colour has appeared the patient's condition may be regarded as desperate. It is evidently bound up not so much with mechanical disturbances in the pulmonary circulation as with the condition of septicæmia. At one time we thought the colour might be due to methæmoglobinæmia, or even to the production of some other pigment in the blood, but the spectroscope has revealed no abnormal bands nor is there, judging from our experiments, any defect in the oxygen-carrying capacity of the blood. The condition is apparently that which Dr. J. S. Haldane has termed "anoxæmia," precisely similar to what is seen in cases gassed at the Front, and possibly due to analogous causes, to judge from the histological changes seen in the lungs.

Although the *respirations* are rapid, orthopnoea is absent, and indeed the condition appears to be a polypnoea or tachypnoea rather than a dyspnoea. Nor is heart failure encountered. The pulse throughout is often quite regular and infrequent in comparison with the temperature.

*Nephritis* has been present in a large number of cases, and a striking feature has been the absence of oedema, and also of hæmaturia.

Despite the frequency with which *delirium* has been met we had no single case of meningitis, although the cerebro-spinal fluid was specially investigated in a number of cases.

Two rather peculiar features are worthy of note. In upwards of twenty cases we have seen spontaneous rupture of one or both rectus abdominis muscles, the immediate cause of which appears to have been the effort of coughing, but disease of the muscle must have been present. And in fifteen cases palpation has elicited widespread subcutaneous crackling of the deep tissues of the chest, neck, and back, the result of *subcutaneous emphysema*.

Another distinctive feature has been a characteristic stench which appears to exude from the body as a whole. This stench was remarked upon occasionally in sporadic cases of "purulent bronchitis," and so appears to be specifically related to the infection.

*Treatment*.—Despite the large number of drugs which have been recommended for influenza, our experience based upon a very extensive employment of the orthodox specifics and using a large number of controls, has led to the conclusion that not one has any unquestionable action on the course of the disease. Although common sense naturally dictates the greatest reasonable precaution possible, even for the mildest cases, yet the virulent septicæmic type appears to originate *ab initio*, and to develop in spite of early treatment. But I would add a warning that an attempt to belittle the condition and allow the patient to return to his ordinary duties after a short afebrile period has been poor economy. In very many cases—I am speaking of the present epidemic as distinguished from the cases in June, which took a much milder course—a recurrence has occurred on the third day after the patient has been allowed to rise, unless we have allowed a clear three days from the last pyrexia even in the mildest case to elapse before the patient leaves his bed.

When one turns to consider the virulent case, so called "influenzal pneumonia," I can without hesitation assert that there is hardly any sort of treatment which we have not tried, and that not one

single line of treatment can be credited with any real value. Early in the epidemic we were persuaded that the "blue" cases invariably succumbed. Later we were fortunately able to record that a certain, even if a small, number recovered, and yet among the recoveries were patients whose condition was regarded as so desperate that any special treatment then on trial was not undertaken, since failure in these instances could hardly be a reflection upon the adequacy of the treatment. Venesection, as one might expect, proved useless. Oxygen, even when continuously administered by the Haldane apparatus, appeared to yield no advantage. Subcutaneous saline infusions, with one curious exception, and intravenous infusions of saline and of glucose in varying strengths, were also tried without success. Antipneumococcal and anti-streptococcal sera were employed, although not on a very large scale, but nothing resulted to encourage their continued employment. Vaccines have also been employed, but again not on a very large scale. As a consequence of one subcutaneous or rather intramuscular saline injection, suppuration occurred at the site of inoculation, with sloughing and the formation of an abscess, in the pus of which were identified *Staphylococcus aureus* and the diplostreptococcus morphologically resembling the organism recovered from the heart's blood in some of the fatal cases. This patient recovered from an apparently hopeless condition, and the happy accident encouraged us to attempt the production of similar "fixation abscesses" by further intramammary infusions, and later by the injection of turpentine and a live culture of streptococci. But in no other instance did any suggestion of suppuration occur at the site of inoculation. As one would expect, when empyema, that is to say Nature's fixation abscess, developed, the prognosis was relatively very good.

*Prognosis.*—In the admittedly serious cases we have found it impossible to establish criteria. The "blue" cases which recovered were quite indistinguishable in any features from those which died. Cases regarded as beyond redemption recovered, encouraging the determination never to abandon hope while there was life, and we have even had the curious experience of thrice regarding as hopeless one man who recovered, relapsed, recovered, relapsed, and then finally recovered. An even more painful indication of one's prognostic deficiency was afforded by cases which, not only upon admission but even for several days of treatment in hospital, appeared to run a comparatively trivial course, and to give rise to no legitimate anxiety; the patients then suddenly took a turn for the worse, rapidly developed cyanosis, and died within a few hours of being only trivially ill.

*Prophylaxis.*—The precautions we adopted were a routine gargle of dilute potassium permanganate or tincture of iodine for those in attendance on patients, and for those patients who had had a comparatively mild attack. In addition, all medical officers, nurses, and orderlies were instructed to use a gauze mask around the nose and mouth whenever they were in attendance upon patients. In the large venereal division of the hospital only two or three sporadic cases appeared—these had evidently entered the hospital with the disease; they were immediately segregated, and no instance of infection of other patients occurred. Our views upon the inefficiency of treatment, both as regards the aborting of a mild attack or the prevention of its development into the virulent form, to say nothing of the virulent form itself, may not be supported by others; but they are the expression of an opinion derived from a very considerable experience, and may help at any rate to emphasize the relatively great value of early segregation if more radical prevention cannot be achieved.